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THE FOUNDRY

VOL. 3. DETROIT, MICH., SEPT. 1893. No. 13.

AN ORNAMENTAL IRON FRONT.

WE are indebted to *Ornamental Iron* for the cut appearing on the next page of a new store front recently erected by Winslow Brothers, of Chicago, in front of the store of Burley & Company, at 145 and 147 State street, in that city.

Foundrymen will be interested in it, not so much on account of the design or the richness of its ornamental features, but because the material comprising it is something new, and bids fair to shortly revolutionize present systems in ornamental iron fronts for buildings of this class.

Ornamental Iron, in speaking of the subject, says:

While the arrangement of the constructional masses, so simple in themselves, limited the field of ornamentation, a study of the illustration will show that the designer has not only met the conditions and respected the limitations, but has imparted a rare grace and beauty to the ensemble without in the least detracting from the dignity inherent in the constructional form. The treatment has been broad and frank, the ornamental features being held in subordination, a pleasing example, on a limted scale, of ornamented structure—the richness of the material, in its plain and ungarnished surfaces, being in itself ornate in the highest degree, and it is to the material rather than to the design, which speaks for itself, that attention is directed.

Electroplating on cast iron has been attempted heretofore, both in this country and in Europe, but never with success, as the wrecks of otherwise fine structural objects in this city and abroad attest. The cause of the heretofore failures has arisen from the susceptibility of iron to the action of the solutions, and the failure to secure the base metal from this action for a period of sufficient duration to secure a homeogeneous coating. Experiments with paint as a protective coating were made in Paris with apparent success, but with ultimate disastrous results. Park benches and sidewalk booths and pavilions, erected by the municipality, had been treated in this manner, and the outward appearance was for a time all that could be desired; but in a short time the paint became disintegrated, and the street gamin amused himself by stripping the copper bronze from the surfaces in ribbons and sheets. In this city there are likewise examples of a similar kind where the plating has so entirely failed of its ornamental purpose as to require painting in order to hide its ugliness and retain its preservative qualities.

As a result of a long series of experiments these obstacles have been overcome, and a method of treatment has been perfected whereby the surface of the iron receives the deposit directly, and an adhesion secured which is impervious to all attacks and gives an enduring quality to the work never before secured. We speak advisedly in asserting that this process is peculiar to the duplex bronze on iron produced by the Winslow Brothers Company, and that by no other process yet devised or at present in use can or has a satisfactory result been secured.

The metal itself is a form of bronze, practically indestructible, entirely impervious to atmospheric influences and unaffected by the impurities emanating from the multifarious sources existing in all large cities, except that a slow oxidation gradually brings about a change in the surface color which enhances

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rather than diminishes its beauty of tone, giving to it any added artistic charm. This change in no degree affects or disturbs the integrity of the metal, which, as we have said, is practically indestructible. It will outlive the stone foundation upon which it stands, and remain intact long after the iron and wood which supports it have crumbled to oxide and dust.

In addition to its beauty, its richness and its quality of endurance, it is clean and wholesome beyond any material which can be used for the purpose. It absorbs neither filth, dirt nor moisture as do wood and stone; floating impurities in the atmosphere will not adhere to its surface, and when they do become lodged in the foliations the hose will remove them at once. It requires neither paint nor varnish either to preserve it or remove dinginess as on wood and iron. In its adaptability to the purpose to which it is applied in this instance it is unquestionably of the highest rank—in fact we know of no material which equals it either in its artistic quality, its practical utility or its indestructibility, the trinity of characteristics essential in costly structures.

They Arose to the Occasion.

A PRETTY young schoolma'am in Kiamath County, Ore, puzzled the powers of pronounciation of her class recently with the word "husband" chalked on the blackboard.

To help them out, she asked: "What should I have if I should get married?"

"Babies, ma'am," shouted the class in unison—*New York Sun.*

In times like these when almost every manufacturing concern is complaining of hard times and lack of orders it does one good to find that there is occasionally a concern that is running full time and has plenty of orders. The Berlin Iron Bridge Co., of East Berlin, Conn., are full of orders and are running their entire plant full time and portions of their work overtime. They have contracts for a large amount of work including a New Electric Light and Power Station at Lynn, Mass.; a Draw Bridge at Salem, Mass.; a new Foundry Building for the New Home Sewing Machine Co., at Orange, Mass.; an Iron Building to go to Tampa, Fla.; a large Bridge for Chester County, Penn.; a new Iron Storehouse for the New York Knife Co., at Walden, N.Y.; a large Power Plant for The Philadelphia Traction Co., of Philadelphia, Penn.; a large Cotton Shed for the Southern Pacific Railroad Co., at New Orleans, La.; a new roof for the Purifier House of the Northern Liberties Gas Co., at Philadelphia, Penn; a new Power House for the Reading Traction Co., of Reading, Penn.; a new Power House for the State Street Horse Railway Co., at New Haven, Conn.; a Car Barn for the Easton Transit Company, at Easton, Penn.; a large Smelter Building for the Anaconda Smelting Co., at Anaconda, Montana. Besides these they have numerous small jobs scattered throughout the country, which will employ their entire plant until after the 1st. of Jan. The Company seems to be particularly fortunate in securing work like this at this time.

World's Fair Items.

J. H. Bass, of Fort Wayne, Ind., shows in the transportation building a large locomotive cylinder, together with some cast gears, all of which reflect great credit on his foundry.

D. M. Sangum, of Moscow, Russia, has an exhibit of nine bells in the Manufacturer's Building, which are noteworthy because of the amount of ornamental work expended on the outside of the pattern.

The Fort Wayne Corliss Engine Works show near by in the Transportation Building a large cast iron cylinder for one of their Corliss engines, and is a fine piece of work off of a different pattern.

Christofle, of Paris, France, has a fine exhibit of galvano plastic brass and bronze work in the Electricity Building. It is mostly in the form of work for electrical purposes, but contains much in the way of ornamental work for light house decorating that looks very fine.

AT THE WORLD'S FAIR.

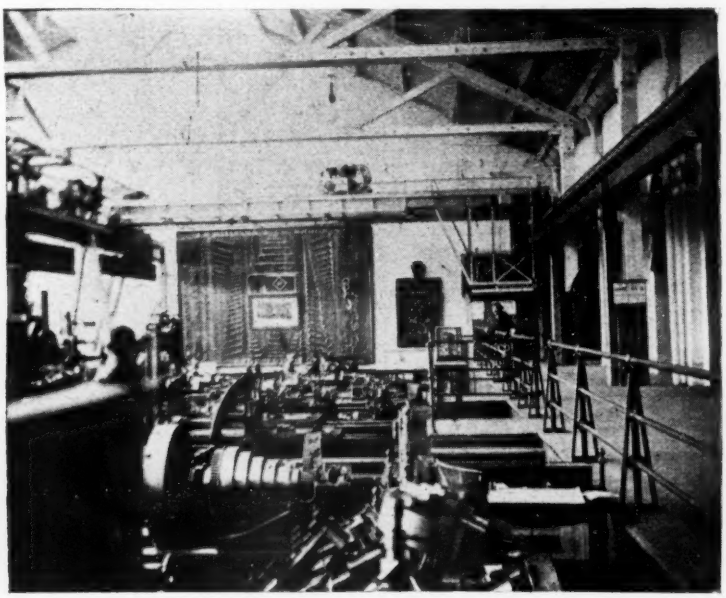
The Shaw Electric Travelling Crane.

WE show by this illustration a patent Three Moter Electric Traveling Crane, ten ton capacity, with which fourteen tons are handled, manufactured by the Shaw Electric Crane Co., of Muskegon, Mich., in operation, for use and exhibition in the World's Fair Machine Shop, equipped by Manning, Maxwell & Moore, of 60 South Canal St., Chicago, and 111 Liberty St., New York.

The operations of this Crane are practically perfect; the operator can move it up and down the shop, and hoist and lower with such ease and precision that it shows at once what a great advantage a Crane of this character is in machine works and foundries where heavy machinery has to be moved around and put onto and taken out of lathes, planers, etc., and clearly shows the advantage shops equipped with them have in economy of manufacture.

One of the special features in the Shaw Patent Three Motor Electric Traveling Crane, is in that the three movements of the Crane, to wit: moving the bridge up and down the shop on its runway; moving the trolly across the bridge on its track; and hoisting and lowering the load to be handled, are each operated by an independent motor. One motor is carried on the bridge for the movement of the bridge, two on the trolly, one for moving the trolly across the bridge, the other for hoisting and lowering, These movements can be operated simultaneously or separately at the will of the operator, and at such speeds between maximum and minimum as the work may require.

Another feature of the Shaw Crane, is in that there are two hoisting or winding drums on the trolly; the ends of the hoisting chain are attached to each one winding on from opposite sides of the trolly, thus keeping the block central while doing the hoisting. The two chains are wound up on the two drums instead of as in the ordinary method on one drum and hoisted by one chain. It will be seen by this arrangement the load being carried will have equal distribution on the trolly, one fourth of it always on each of the four truck wheels, and thus the load will always be equally distributed on the bridge or girders of the Crane. This is an im-



Photographed by our own Artist.

provement appreciated by those who have the Crane in operation.

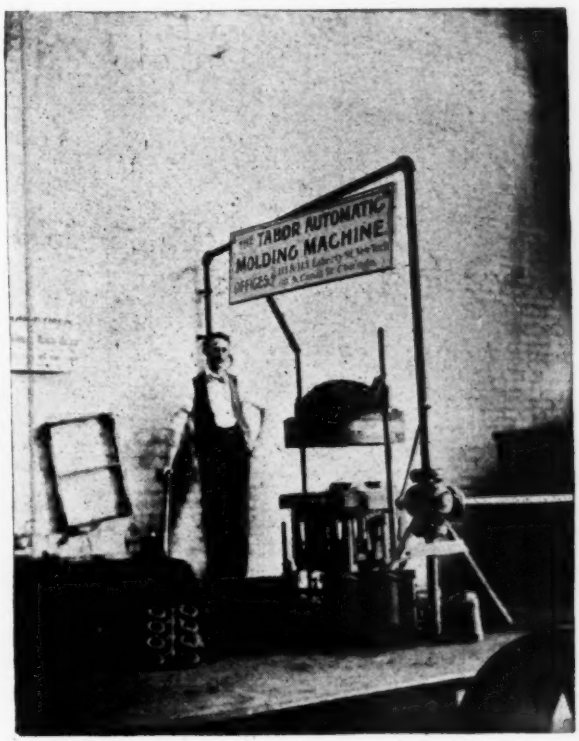
There is nothing more important in the construction of a Crane than its brake mechanism. On other Cranes only one brake is used, it being the usual strap brake, controlling the load entirely by friction. The use of this brake only is often found dangerous, inasmuch as there is only one brake, and particularly from the fact, that by its use the load is jiggled down instead of gradually lowered. This is apparent from the fact that when the brake is lifted, the load commences to let itself down and the speed will be constantly accelerated until checked up by the brake, and as soon as checked up, the brake has again to be released and the same jiggling operation continued. Such a Crane is not good in a foundry where careful lowering of a mold, cope or cover must be done.

The Shaw Crane overcomes this by an arrangement of the Shaw Patent Duplex Automatic Brakes, accomplished by a mechanical device in connection with the ordinary strap brake usually used, and which allows the load to be lowered gently, as it were, to slip the load down, possibly expressed better by saying "laying the load down," while the brakes on other cranes must drop the load.

About 75 of these Cranes are in operation, varying in capacity from 3 to 80 tons, of various spans, all of which are giving great satisfaction.

The Tabor Molding Machine Exhibit.

The Tabor Molding Machine is the only one exhibited at the Fair in operation and with the exception of one we saw for molding pulleys in the German Department it is the only molding machine there. The one the Tabor Company exhibit and which we illustrate here is what is known as their "Automatic Duplex." The steam cylinder which is located under the floor furnishes the power for ramming, etc., as described in an issue of December, 1892.



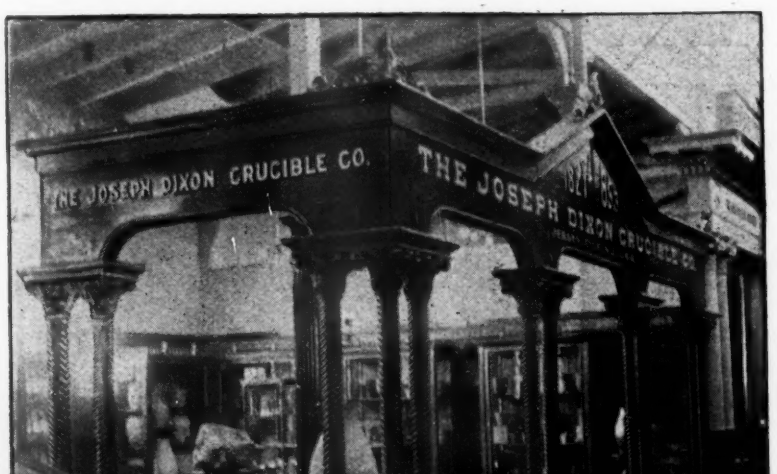
Photographed by our own Artist.

This machine was designed especially to meet the requirements of the iron and brass founders who are engaged in making light castings for the trade where competition is severe and prices low.

Its distinct feature is that both parts of the flask, namely, the copes and drags, can be molded at one operation, consequently a complete mold is made at one time or two nowels or two copes can be made if so desired. Any size flask can be used as long as it does not interfere with the ramming capacity, and these machines are especially recommended for such work as steam fittings, such as sight feed lubricators, injectors, globe, gate, angle and check valve bodies in brass, elbows, tees, return bends and all valve cases in iron plumbers' supplies, such as brass fittings and iron tees, Y's and bends, sewing

machine castings and hardware; agricultural implements and lighter car castings, such as brake-shoos and journal bearings, and, in fact, bench work generally.

The Tabor Molding Machine Company keep a competent gentleman in charge of the exhibit which can be seen in operation at all times, and we would recommend everyone interested on that subject to give them a call at Manning, Maxwell & Moore's exhibit to have it thoroughly explained.



Photographed by our own Artist

The Exhibit of the Joseph Dixon Crucible Company.

THE Joseph Dixon Crucible Company is said to be the only concern in the world which manufactures any article of which graphite is a component part. With the invention by Joseph Dixon, in 1827, of the plumbago crucible, the crucible business was revolutionized and at that date also begins the manufocture of the Dixon Stove Polish, foundry facings and the developement of an industry now grown to the enormous proportions and fittingly represented by the Joseph Dixon Crucible Company. They have two exhibits at the Fair, one in the Manufacturing Building of lead pencils, etc., and the one which we illustrate herewith in the north-east gallery of the Mines and Mining Building. The latter exhibit is of a general nature and includes a wide range of articles depending more or less upon the graphite industry, all of which are manufactured by the Joseph Dixon Crucible Company. It occupies a space 25 by 28 feet. A very handsome cherry facade fronts the space, while the sides are hung with tastefully arranged portieres. Crucibles, retorts, ladles, stopper-heads and nozzles, graphite boxes, phosphorous chargers, resistence rods and devices, incandescent filiment forms and other special goods made of graphite are shown in upright cabinets.

In another case is shown the development of an electrotype plate, in which process the use of graphite is an essential. In still another case are shown over fifty varieties of graphite, for as many difierent uses and under as many different names, such as graphite for lubricating, stove polish, foundry facings for green, dry or loam castings, core wash, ingot mold wash, shot and powder

glazing, electrotypers, gilders' use, hatters' use, rubber packing, piano and organ actions, "potleading" yachts, for crucibles, lead pencils, paint pigment lubricants, etc. There are also shown samples of graphite from all the principle sources from which that article is obtained. One very fine sample from the Island of Ceylon weighs nearly 300 pounds. Comfortable chairs with writing desk and stationery for the free use of those who may desire it, give to the exhibit an air of genial comfort and ease.

The Schuylkill Valley Stove Company, at Spring City, Pa., has reduced their working time to three days each week on account of dull times.

THE RELATION OF THE WORKMAN TO HIS FOREMAN.

C. A. BURTON.

IN looking around us, and looking over the field of labor, as it exists today, brings to my mind the idea that men, as a rule do not think of their relations to their foreman. They do not observe the power they are for good, or bad, in their relation to him. There is a fine sense of honor, to an upright man, in his occupying a proper relationship with his officer, that is lost sight of in many cases, by the men. The relation of the workman to his foreman, has a bearing in a commercial way, that works for, or against, the ultimate success of the shop. The workman enters the employ of his foreman, not actually, but to all intents and purposes, and he will, if honestly inclined, devote his skill toward accomplishing the objects sought for, by his foreman. A piece of work is handed to him, with instructions to make a number of pieces, and likely he is told where flasks are to be had and other details to put him in the way to expedite the work. It should be his pleasure and certainly his duty, to accomplish what he honestly can do each day till the work is completed. The foreman hates to drive him to it, the men around dislike to see it done, the discipline and rule of the shop may be against it, and the standing of the men, in the estimation of men and foreman, is lowered. But all this will be avoided if an honest attempt is shown to execute as much as is his ability to do. The man who gets a job, for the purpose of getting in ten hours a day and six days a week, and shows no desire that each day shall net his foreman a trifle more than cost, is not sustaining a proper relation to his foreman and the foreman gets the blame for lack of product out of the foundry, and finds himself driven either to new men, or to the driving process. Some men are not able to do a days work, unless they are severely admonished at the outset by the foreman, and it is such men that are causing foremen to lay awake nights and wonder, "will the day ever come, when men will do their work without pressure." The foreman asks all his men, at all times, to be careful of the firms property, riddles, shovels, rammers, buckets, brushes, etc., etc. He urges the men not to use molding shovels for handling hot scrap. To avoid leaving shovels sticking in sand heaps, to shake out flasks likely to burn, and dump bottom boards to save them, to lay up the patterns after brushing them well where they will not get broken, or misplaced, to cut the stream of iron before running over the flask and burning it, and possibly somebody's foot, as well as waste the metal, and a hundred other things, that all good molders know of. The observance of these things go to help his relation to his foreman. Then his care of patterns, there are so many men who cannot resist the temptation to drive a spike into a wooden pattern, when a rapping plate is on, but they have lost the screw and will not take time to look for it, they leave patterns to be knocked to pieces, rather than to return them to their proper place. The use of a sledge on a pattern is source of a great deal of trouble to the foreman, who, provides he thinks, everything to get that work properly done, and a careless man pounds the pattern all to pieces with a hammer, when it is very often entirely unnecessary. Then his relation to his foreman should make it imperative that he uses

his talents, and genius, in what ever amount he may be gifted with, to further and help along the work in hand and aid in the solution of problems that daily come to nearly every man. Taking the trades as a whole, there are very few foremen who are called upon to use a greater amount of management, native shrewdness and calculation than the foreman of a foundry, doing a large and miscellaneous class of work, and the effort of his men to bridge over trouble is hailed with delight and satisfaction in that it which shows that he has the cooperation and thought of his men. This is a happy relation and should be cultivated by both parties. The workmen should be careful in the matter of having his tools always at his hands. How a foreman growls to see a man always running after some parting sand, or a lifter, or a brush, or a clamping iron, or a blacking bag, or something else, that he has to borrow of his neighbor, and most always forgets to take back. The foreman nas no words to express his disgust at such men, it should be avoided and care used in these matters, as without it, it breeds dissatisfaction and dislike. Reproof for these things may correct the matter for a time, but the thoughtless man will go back again and soon bring wrath on his head again. The loss of time and money, incident to this kind of thing all over a large shop, would worry them some if it had to come out of their pockets. The friendly relation can be made much stronger by observing the result of thoughtful care, in the expenditure of time, tools and material, by the men. Be careful to fully understand what is wanted of you. The foreman will give you a piece of work, and maybe you will not understand just what he wants, remember that it is a part of your days work, to take time to understand the detail of the work, and get started right, to know before hand what he wants. You must be aware that it takes less time and costs less money to have an order repeated to you, than it does to lift off a lot of copes, and reset cores, stop off places in the sand, or to set chills. The understanding of the work is the first consideration, and no proper foreman will hesitate to have his man thoroughly familiar with the order. There is hardly a tradesman who has more time to devote to pure thought on these matters than the molder, and hardly a trade that would receive as much thought. But when molding the molder has his mind bent on the intricacies of his work and can consider that he can abuse his foreman's tools and appliances if he sees fit, and he can save also if he sees fit. In intercourse with molders it has often occured to me that that they should devote more time to studying, reading and reflecting. The foreman has often said "if these men would only consider where the last iron strikes, or only consider where the first iron strikes, or when to vent and not, and how to clamp, and the functions of a gate and how and why to ram hard or soft, etc. They can easily ascertain it, if not by experience personally, then by reading the experiences of others. All foremen are presumed to take the position, that if a man hires as a molder, that he is sufficiently experienced to make the common class of work without instructions, but many men in their conceit or lack of discretion, hire as such, and immediately the foreman finds it out then the friendly relation ceases to exist. By being frank no money is lost, as the man who sails under true colors has nothing to fear, and has the confidence and esteem of his foreman. The frank and friendly relations between the men and foremen, furnishes him with a power to do what they are called on to do that is simply beyond the danger of failing, and the assurance of the foreman that his men are in every way his allies, and cooperators, makes success a sure thing and it can be made so in no other way.

The apprentice boy is the future bulwark of the foundry, while the molder that is, passes away, the molder to be, is coming up, by all means men, raise the standard of the trade excellence higher by imparting to the learner the principles of the trade, and in aiding him, aid his foreman and proprietor. One of the greatest reasons for the comparative slow development of the science and practice of the founding of metals, is due to this lack of imparting know-

ledge to the apprentice, and lack of a desire on the part of the journeymen to have his follower better than he. There are some shops that are trying to create a school for the education of the young molder, there are schools for everything nearly, but beyond a few manual training schools there are no schools for the molders. He must learn by close application to his trade, and the foreman relies a great deal on the apprentice, and he will show a great deal of interest in the quick boy, who is devoting his energy and thought to his trade. It is his help, and it is to be hoped he will see better times in sight soon. There is a moral relation existing between men and foreman, it relates to his honestly following directions and putting his time faithfully in for the company's good and taking a pride in the product of the shop, and in the fact that the company is making money. To the honest workman hours are as nothing to him, his thought is first to give value received for his wages, second to educate himself day by day to be worth more and more to his employer and get his wages advanced, and third to teach himself to consider that he is a factor in the prosperity of the company, and it gives him a pride in remembering that it is due to him that success is attained. The relation of men to foremen is made a great deal better also by a display of intelligence regarding founding. The field of foundry literature has been somewhat meagre until within a few years, and now there is no reason why every molder should not acquaint himself with the latest and best methods of getting at a result. The world moves at a tremendous pace now, and the molder is daily called to do what he never had to do before, and it is getting to require a much larger and wider degree of intelligence and thought to completely surround the trade. With the proper relation between men and foreman, he will undertake anything in the foundry line, without, and all is uncertainty and doubt. The foundrymen's trade has not occupied the place in the scale of mechanic arts it should, and it is at least a part their fault. Let men co-operate closer with their foremen, and they will pull the trade up to where it belongs. They are getting the machinery, now supplement that with learning, training and practice, and no one trade will command more attention. The principal of elevation, promotion and advancement is no where more conspicuous than in a well managed foundry, and the demand today is for good, safe, and sober men, with a head full of brains, and a hand to willingly do what it can. The comfort a foreman derives in the pleasant, thoughtful and painstaking co-operation of his men with him, is beyond expression, and the success of great foundries is due to this as much as anything else.

The status of the trade today is such that it takes a lifetime of personal experience to reach the present perfection, and the only way to come fully prepared early in life, to seize and solve these problems of today, is to profit by past experience of others and study the philosophy of molding and founding as it is presented in the present practice.

A Disabled Witness.

THE following good story is told of a Glasgow bailie. In Scottish courts of law witnesses repeat the oath with the right arm raised. On one occasion, however the magistrate found a difficulty.

"Hold up your right arm," he commanded.

"I canna dae't," said the witness.

"Why not?"

"Get shot in that airm."

"Then hold up your left."

"Canna dae that, ayther—got shot in the ither airm, tae."

"Then hold up your leg," responded the irate magistrate; "no man can be sworn in this court without holding up something."

A HINT.

When the skies were blue and all was bright,
And soft and balmy was the weather,
On shining cycles, swift and light,
Sweet Maud and I rode out together.

"If we," quoth I, "could side by side
Ride thus along life's path, at random."
She bent her head, then blushed and said,
"I think I should prefer a tandem."

—Outing for August.

A MODERN CAR WHEEL PLANT.

Description of Jackson-Woodin Manufacturing Company's Car Wheel Plant.

AS foundry practice divides itself into specialties, the various classes of equipment for distributing and handling the iron assumes a variety of forms especially adapted to the economical production of each particular class of work.

The cut on page represents an interior view of the Jackson-Woodin by the Detroit Foundry Equipment Company. By its use all available space is economized to the fullest extent, and the same may be said of the operating labor and distributing expenses.

The distributing equipment proper consists of eight overhead Whiting Patent Floor Cranes and two overhead Pitting Cranes—all operated by power, and controlled from any point along the floors or pits. In connection with this

INTERIOR VIEW OF THE JACKSON-WOODIN MANUFACTURING COMPANY'S CAR WHEEL PLANT.

Manufacturing Company's new car wheel foundry at Berwick, Pa. The reader will at once note the absence of the old time swing crane and the omission of the circular arrangement of chills, flasks and pits so frequently seen in old style wheel foundries. On the contrary, everything seems to be done in recognition of the fact that a straight line is the shortest distance between two points. This improvement is due to the Whiting car wheel foundry system, manufactured is a power ladle train and power reservoir and reservoir tipper, a Whiting cupola, and a Whiting wheel cleaner. In operation, the molten iron is run from the cupola into the power reservoir, and from this is poured into distributing ladles running on a train of ladle trucks. This train is operated by a reversable Pulling Machine, and by this rapid and simple method the sixty-five or seventy tons of iron poured each day is easily distributed from the cupola

to the floor with no greater physical labor than that exerted by a boy moving a hand lever.

At the floors each ladle is lifted by the overhead crane and transferred with a similar small exertion of labor to the wheel; the wheel is in turn taken from the flask and delivered to the overhead pitting cranes and by these to the pits, and when annealed is taken from the pits and delivered to the power wheel cleaner—all these operations being accomplished with the smallest amount of physical labor.

The cleaner is of the Whiting type, and cleans, polishes and takes out the cores of seven wheels at a time. By this system the iron from the cupola to the yard is hoisted and conveyed by power in the most direct and economical manner possible.

The system also economizes room to the extent of forty to fifty per cent, and the economy in labor is also in proportion.

The interior of the foundry presents a neat, clear, unobstructed view, the overhead crane tracks being suspended from the trusses, and the machinery is entirely overhead. The unsightly jib cranes are entirely done away with. The entire plant is an object lesson in the value of the adaptation of equipment to requirements.

This same patent system is employed in many of the largest car wheel foundries in the country, and under favorable trade conditions it may be assumed that fully two hundred thousand tons of iron are annually handled by this method, representing an immense aggregate saving in the cost of the manufacture of car wheels.

Chicago up to Date.

YOUNG man (just presented to charming woman)—There is really something familiar about your face. Haven't we met before?

Charming woman—(reflectively)—Let me see. Your name is Witherspoon. Is Everett Witherspoon a relative of yours?

Young man—Well, he's my father.

Charming woman—(vivaciously)—Why, then, that explains it. I'm your mother. I was his wife for five years after you were born.

(They become very chummy.)—*Town Topics.*

AN INCIDENT IN EDISON'S EARLY LIFE.

IN telegraphy, operators are taught; receivers must be born. Equipped by nature and training, Edison gave up the newsboy's life, in which he had earned in four years $2,000, the greater part of which he gave to his parents. Now began his migratory career as a telegraph operator. Many ups and downs were his. Often he was cold, hungry and shelterless, for the insatiable impulse to experiment to the neglect of his duties kept him continually out of work. One day he reveled in the praises his ingenuity evoked; the next he was dubbed "Luny" and turned adrift.

Perhaps his most ingenious boyhood feat was performed during an ice jam that broke the cable between Port Huron in Michigan and Sarnia in Canada. The river at this point is a mile and a half wide. The ice made the river impassable, and there was no way of repairing the cable.

Edison impulsively jumped on a locomotive and seized the valve controlling the whistle. He had an idea that the blasts of the whistle might be broken into long and short sounds, corresponding to the dots and dashes of telegraphy. In a moment the whistle sounded over the river: Toot, toot, toot, toot—toot, *toooot—tooooot—toooooot—toot, toot,*—toot, toot.

"*Hello-o, Sarnia!* Do you get me?"

"Do you hear what I say?"

No answer.

"Do you hear what I say, Sarnia?"

A third, fourth and fifth time the message went across, to receive no response. Finally, the operator on the other side understood. Answering toots came cheerfully back, and the connection was established.

The Veete & McDonald Foundry has shut down temporarily on account of a lack of orders.

THE FOUNDRY

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

Published Monthly by

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THE FOUNDRY is issued promptly on the tenth of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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The Detroit News Company, Detroit, Mich.
The M nnesota News Company, St. Paul, Minn.
The Montreal News Company, Montreal, Canada.
The National News Company, New York, N. Y.
The Newark News Company, Newark, N. J.
The New Orleans News Company, New Orleans, La.
The New England News Company, Boston, Mass.
The New York News Company, New York, N. Y.
The Northern News Company, Troy, N. Y.
The Omaha News Company, Omaha, Neb.
The Pittsburg News Company, Pittsburg, Pa.
The Rhode Island News Company, Providence, R. I.
The San Francisco News Company, San Francisco, Cal.
The South West News Company, Kansas City, Mo.
The St. Louis News Company, St. Louis, Mo.
The Toronto News Company, Toronto, Ontario, Canada.
The Washington News Company, Washington, D. C.
The Western News Company, Chicago, Ill
The Williamsburg News Company, Brooklyn, E. D., N.Y.
The Wisconsin News Company, Milwaukee, Wis.

MORALITY OR LEGALITY.

WITH the advancement of thought, which is now so apparent in business circles, even, it would seem that among successful business men the terms of morality and legality should be synonymous. We say successful business men, for success in business implies something besides hard work. It implies more than ordinary intelligence, and in many cases, that integrity of character and honesty of purpose which we are accustomed to hold up to our school boys as examples worthy of emulation.

It is too evident—more's the pity—that oftimes the moral obligation sinks into insignificance, and even that obligation demanded by law is lived up to with the poorest kind of grace.

The entire country is suffering at this time with an overdose of doubt, otherwise a most plentiful lack of confidence. The restoration of this important factor of commerce might be aided if business principles were placed upon a more honorable basis. Joint Stock Companies are incorporated to avoid the responsibility and liability incurred by partnership, and limited partnership is entered into for a like purpose.

The recent failure of the Allen Foundry Company in this city is an illustration of the latter method. This co-partnership existed between C. A. Newcombe, special partner, and his nephew, Lloyd N. Allen, of Detroit. The senior partner is of the old established firm of Newcombe, Endicott & Company, dry goods merchants, enjoying the respect and the profit of many years of successful business. Through the connection of this gentleman's name, the Allen Foundry Company enjoyed unlimited credit and a most satisfactory commercial rating and report. After a career of mismanagement, including a ruinous cutting of prices, they have made no money. The senior partner, concluding that the various creditors who have supplied them with material should pay a penalty for relying too confidently upon his business reputation, sells the buildings at a ruinous price, turns the proceeds over to the bank to retire obligations bearing his endorsement, and the next day assigns to an employee of their own office.

The total liabilities of this defunct firm is so small that it would reflect more credit on the millionaire partner had he paid the bills and pocketed the loss.

Morally it was an obligation of his own, legally it was not—that is so far only as his special capital provided.

The dodging of a moral responsibility is so easy, when dollars and cents are in the way, that it is liable to be done until a nearer approach of the millenium, and there is no indication of its striking this locality just yet.

Would do no Good.

THROUGH the many avenues which are provided for the modern paper to secure the news of the day we have been supplied with a great many items this past month or so relative to foundries making assignments, going into the hands of receivers, shutting down temporarily, etc., until it has seemed as if the entire foundry world contemplated going out of business by one route or another. This has been principally owing to the financial disturbance, and we have decided to publish this month none of it, believing that it is our duty at this time to do what we can to encourage confidence and general hopefulness, and while our idea of the matter may not be everybody's, we believe it is best.

The Scrap Heap.

THERE are indications of a general improvement in the financial situation, not in the commercial or manufacturing situations, they were comparatively speaking all right before, but being dependent on the money market they are controlled almost entirely by it.

We have now passed through a seige of several months duration and much has been printed, written and said concerning its causes and remedies and with the result that a great amount of information has been dissminated and the American people have received more education on financial matters than in any previous ten years of their history.

* * *

And it is well, because after looking the matter over they are beginning to find out that the trouble outside of one or two National issues whose effect has been somewhat magnified, lies first of all in the fact that there has been too much credit placed in unworthy parties all over the United States, and this has resulted in a sudden pre-emptory and indiscriminate contraction of credits and an equally sudden and emphatic contraction of the currency, or in other words those who had manufactured goods or raw material to sell on credit preferred to keep them, and those who had money preferred to keep it rather than loan it or place it in circulation, why? In both cases the answer is the same: they lacked confidence in the customer or others with whom they had been doing business to carry out any pledges they might make.

* * *

The best of securities have been worthless. Those which in ordinary times were of sterling value have been useless. Wealthy manufacturing establishments have either failed or shut down and this too in a country the richest in the world in its natural resources.

Americans are noted above all things in every quarter of the globe for their patiotism and self-confidence and their indomnitable faith in the solidity of their natural prosperity. No other country approaches this in push, enterprise, natural wealth, progress, ability to watch out for its own interests and no other has as pleasant a prospect for future power and prosperity.

* * *

Yet we find that on every hand there has been a general "laying down of hands," cessation of business, and a wild scramble to make collections for the sake of self-preservation.

* * *

The lesson taught is not wasted either; sellers are finding out who are trustworthy and who are not, who are honorable and who are not, and if the experience through which *they are passing are remembered more care will be experienced in future.* Elsewhere we refer to the failure of the Allen Foundry Company of this city under circumstances that leave room "to point a moral and adorn a tale." Is it any wonder we have a general lack of confidence in the country and that the system of business credits and accommodations has undergone a most severe strain. In this case (and it is only one of many frequently occuring) we find advantage is taken of the wealth and standing of a partner in a *limited* partnership to secure *unlimited* credit and increase the liabilities to an almost *unlimited* extent, and while the special partner may plead "honest before the law" will be so judged by those knowing the circumstances? We once knew a business man who gained much notoriety because when taken to task repeatedly for his broken pledges he would retaliate by asking if "there was any written agreement to that

effect." While there may be no written agreement there is certainly an implied obligation or contract in these cases to say nothing of the arguments that might be advanced in support of a certain "Golden Rule."

* * *

Such cases as the above are an injury to every reputable business man in any community, because it casts a reflection on our whole business world and every honest man should show his sincere contempt for such a breach of business law amounting as it does to the verge of rascality. We do not desire to be considered as personal; our remarks are levied at the whole system and the case we specify is only typical of hundreds of others in which the guilty parties continue to hold up their heads and pass current as reputable men in the community, paying their debts when they have to, not because they should or want to.

* * *

We heard the remark made by a gentleman of highest probity and standing in the affairs of the nation not long since while addressing a newsboys gathering, that the most cunning, the shrewdest thing anyone could do was to be honest, as a monetary investment from a strictly business and materialistic point of view it is certain to pay in the long run, and the man or set of men who conspire to "cheat, wrong or defraud" will lose money by the venture.

No Wonder.

"THE financial crisis, which has been so severely felt all over the country, is having the effect of exhibiting to the world with extraordinary conspicuousness the astonishing solidity and stability of the resources of Chicago. In 1873, this city was deeply in debt to the East, and presented a picture of dependence upon that section, in broad contrast with the situation now; and recently, when the heavy discount in New York exchange, coupled with the remarkable strength of the banks here, showed that a complete reversal of the old conditions had taken place, and attracted universal attention to the fact that Chicago has become self-reliant and entirely equal to her occasions."

The above we clip from a well known Chicago trade paper, the *Industrial World*, and while we are great admirers of the push, genius and public spirit of the great Western Metropolis, yet we think it permissible to draw attention to the fact that the editor of the paper referred to must be rather cramped for "copy," or is straining a point very hard to sing the praises of his city. It is just possible that the able editor referred to is aware of the fact that at this time and for many months past, if not, indeed, for the past three years, there has been a steady influx of outside capital into Chicago. Just now the average paid attendance at the Fair exceeds 100,000 a day, and it is fair to assume that each one of this 100,000 spends on an average at least $5.00 per day for room, board, admission fees, shopping, amusements, etc. It looks very much as though the nice little sum of $500,000, or half a million of good honest coin of the realm, is left with the residents of the Windy City every twenty-four hours, to say nothing of the millions sent there by the United States Government and the various states, and other sources of income that will swell the above considerably.

No wonder Chicago banks are able to meet the demands for currency, when the balance of the country is being taxed at the above rate to their benefit. No wonder there is not the same pressing demand for cash there when the world is paying it tribute. For all that there have been some disastrous failures there. It is said twenty Chicago foundries have gone to the wall this year, to say nothing of other important enterprises. Neither Chicago, its newspaper, its citizens or its financiers have any reason for self-congratulation on this particular point at this time. They have reason to feel proud of many local achievements, but of this subject the less they say the better.

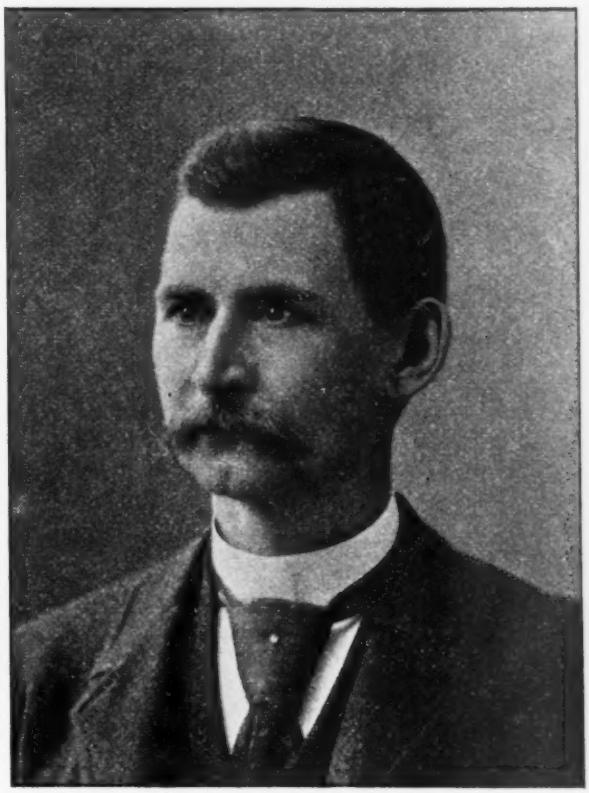
LET US BE THANKFUL.

BEFORE this issue of THE FOUNDRY reaches our readers the back-bone of the money famine will be broken, and the people who entered into the combination to corner the money market will have discovered that they have failed and commence to re-invest. It will be some time before the business of the country resumes a normal tone, but the worst of the trouble is far in the rear, and a rapid improvement in both cause and effect will be steadily noticeable.

Let us all congratulate ourselves now that the business interests begin to breathe easier, that in the first place it was not worse, and in the second place that many important lessons have been learned that may in the future benefit us all.

Mr. Martin Fox.

THE FOUNDRY has been pleased to publish during the past year for the benefit andi nformation of its readers the portraits, together with biographical sketches of many gentlemen prominent and well known in the American foundry world.



MARTIN FOX.

In our last issue we gave our readers a view of the well known features of Mr. Henry Cribben, of Chicago, who among other things occupies the position of President of the National Stove Manufacturers' Defense Association, and we take pleasure in presenting to our readers this month the portrait of Mr. Martin Fox, President of the Iron Molders' Union, who probably wields a wider influence upon the foundry trade of the country than any other man, and whose administration has been characterized by a degree of conservatism that has called forth some flattering compliments from prominent foundry proprietors.

That the labor organization, or trades union, is rapidly being accorded a certain measure of recognition is demonstrated by the fact that at the meeting of the Stove Manufacturers' Association held recently in Chicago the officers of the Iron Molders' Union were in attendance in response to an invitation from

the Association, and presented their side of the wages question, receeiving well merited applause and many compliments for the able manner in which they had presented their arguments.

THE FOUNDRY has a very large constituency more or less concerned in the matters in which Mr. Fox is so prominently identified, and who will possibly be interested to know something of this gentleman.

He was born in the city of Cincinnati, Ohio, in the year 1848, and commenced to serve his apprenticeship at molding at a very early age, having no opportunities of securing an education other than those arising from a limited attendance at night school during that period. In 1865 he joined the Iron Molders' Union, going soon afterwards to St. Louis, Mo., where he worked a short time, traveling and working in other cities up to the year 1870, when he returned to his native town. As might be naturally expected from one of his disposition, he always took an active part in the affairs of the union. He was a delegate to the molders' convention held in Louisville, Ky., in 1878, where he was chosen as one of its trustees, and re-elected at the convention in 1879 and 1882. Was elected secretary in 1886, and president in 1890. Mr. Fox has received some little criticism from the more aggressive members of his organization for his well known conservatism, but has expressed himself as favoring the policy of harmoniously settling trade disputes and avoiding strikes, and in this he has received the support of a large majority of the society's members. That his administration has been a successful one must be conceded by all, when the increase in the membership and the number of branches is considered.

There is a point in the following humerous story, which sets forth an actual occurence: A mill owner who had purchased a larger engine contracted with a bricklayer to put in the necessary foundations. The bricklayer sub-let the contract to another party. When the engine arrived it was found that the brick work for the bedplate was too wide to make a good job. The bricklayer was sent for, and he decided that the shortest way to remedy the mistake was to chip off the bricks, believing, of course, that the foundation was of solid brick work. When this was attempted the whole side fell in, and the fact was disclosed that the foundation was but a shell, filled in with broken brick and stone. The bricklayer was greatly surprised, and tried to excuse himself for having sub-let the job to such an unreliable workman, saying that he did not understand it, because the man certainly knew better, as he had thirty years' experience. Then the mill owner broke in. He was a Hebrew. "That's just what's the matter," said he. "He's been in the business so long he gets acquainted mit all the tricks. Get me a man who don't know so much."

A Lesson in Finance.

A WELL known Chicago merchant has a customer in Columbus, Ohio. A few weeks ago a bill became due and he sent a statement, but as is the custom in these later days, received no remittance.

Then he notified his customer that he would draw on him for the amount of the bill, $700 or so. This he did.

The bank received the draft and presented it to the customer.

The customer had $300, and wanted to borrow $400 from the bank to make up the amount of the draft.

The bank had no money.

The customer could not pay the draft and so it was returned.

A few days afterwards the customer got hold of a few dollars, which he deposited, and then sent check on Columbus bank aforesaid to dealer in Chicago.

Dealer takes Columbus check to Chicago bank.

Chicago bank refuses to credit dealer's account at face, but will at 2 per cent. discount.

Dealer thinks he cannot afford to pay $14 for collecting $700, so takes check to express company. Express company forwards check for collection to Columbus

Columbus bank pays check with New York draft, which express company delivers to Chicago dealer.

Dealer takes draft to bank.

Bank will credit only on 3 per cent. discount.

Dealer goes back to express company.

Express company forwards draft.

Presents draft drawn on in New York.

Bank endorses check: "Good; payable through New York clearing house."

Express company returns draft to Chicago dealer.

Air blue.

Linguistic pyrotechnics.

Dealer again takes draft to express company.

Orders express company to collect cash or protest draft.

Express Company forwards draft to New York.

Again presents, and informs bank of instructions.

Bank pays $700.

Express company returns cash to Chicago dealer.

All happy.

Time, four weeks and two days.—*Timberman.*

Complimentary.

SUCH letters as the following in answer to those we sent the J. D. Smith Foundry Supply Company, of Cincinnati, Ohio, and the Detroit Foundry Equipment Company, Detroit, Mich., in which we asked them to renew their advertisement in THE FOUNDRY for another year serve to brighten our path and make us more zealous than ever to still further win the good will and friendship of our patrons.

CINCINNATI, O., Sept. 5, '93.

THE FOUNDRY CO., Detroit, Mich.

GENTLEMEN:—In regard to your esteemed favor of a few days since we are much pleased to state that the advertisement we have run in THE FOUNDRY has been most satisfactory, and we would regret to be compelled to discontinue it. This means that we are with you for another year, and all we ask is that you provide the same service. Since the 20th of August we note a continual increase in orders and remittances received and predict a better business between now and the first of the year than we had during same period last year. MAY WE NEVER SEE AGAIN SUCH TIMES AS THE FOUNDRYMEN HAVE EXPERIENCED SINCE THE FIRST OF JULY.

Trusting to have THE FOUNDRY come every week very soon. We remain,

Very truly yours,

THE J. D. SMITH FOUNDRY SUPPLY CO.

DETROIT, MICH., Aug. 30, '93.

FOUNDRY PUBLISHING CO., Detroit, Mich.

DEAR SIR:—Replying to your favor of the 29th inst. would say that we intend to carry our advertisement in same space next year, at the rates offered in your letter of the 29th inst. We are very well pleased with this investment and consider it on the whole as good an advertising investment as we have made.

Yours very respectfully,

DETROIT FOUNDRY EQUIPMENT CO.

The Berlin Iron Bridge Company, of East Berlin, Conn., have received the contract for the new Power Station for the Atlantic Improvement Co., Astoria, L. I. There will be two buildings—a boiler house 62x85 feet, with a dynamo room 70x130 feet. The dynamo room is controlled by a traveling crane to be furnished by the same parties.

NEW YORK COULD NOT HAVE MADE THE FAIR SO GREAT A SUCCESS.

THE city that secured the prize is simply fulfilling its inevitable destiny. Had New York drawn the plum we should have witnessed a worse extortion with the added misfortune of a much inferior exhibition. There is no public spirit in New York, and there is a great deal of it in Chicago. This sentiment alone is more than enough to make the difference between success and failure. The woods are full of citizens willing to begin at sunrize and discourse to you until midnight of the wonders of Chicago. In ordinary times this burning desire to impart just that kind of information is not always appreciated by the outside world; but in times of fairs the spirit that prompts it becomes a mighty engine. It was soon demonstrated that these citizens could work as well as talk, and as a result the White City has arisen as from a fairy's wand. —*Scribners.*

PITTSBURG AND VICINITY.

SPECIAL TO THE FOUNDRY.

The improvement in the condition of the foundry trade in and about Pittsburg during the past month is scarcely perceptible, but the trade has slightly changed for the better. Orders are increasing in a small degree, and the outlook is regarded as being more hopeful. The differences between a number of the local founders and their employees in regard to a wage reduction, while not yet entirely smothered out, are rapidly being adjusted and harmony is being restored.

A receiver has at last been appointed for the Lewis Foundry and Machine Company (Limited), the troubles of which concern have been aired in the circuit courts for some little time past. The trouble arose not from financial embarrassment at all, but from dissensions among the stockholders and officials of the company. The concern has been making large profits and was in excellent shape, but the stockholders and officials were unable to agree. Isaac W. Fronk is the receiver appointed, and he has taken charge of the affairs of the company.

About twenty-five men have been laid off at the foundry department of the Westinghouse Air Brake Works at Wilmerding, near here.

The Harrisburg (Pa.) Foundry and Machine Company has booked orders for a 10-ton steam roller to go to Chicago, a 225 horse power engine for a New York city concern, and a 30 horse power engine for the Washington Navy Yard. The machine company is quite busy, and has many orders in now.

Joseph R. Jackson, for many years the popular and efficient superintendent of the National Rolling Mills, at McKeesport, Pa., has resigned his position. C. I. O'Connor, for some years past chief purchasing agent, and one of the best posted men in the country, is his successor.

The Marshall Foundry and Construction Company recently shipped to the Homestead Steel Works what is said to be the largest ingot mold ever cast in a flask. It is 27x82x130 inches, and is to be used for armor plate. The casting weighs 5,800 pounds.

The Sharon,, Pa., Stove Works has resumed operations after a very brief idleness.

William Todd & Company, of Youngstown, O., have completed a mammoth casting, weighing 35 tons, which will be used as a bed-plate for one of the engines at the plant of the Ohio Steel Company. The company is operating day and night in both foundry and machine shop, and is very busy.

Part of the immense new foundry being constructed at the Edgar Thompson Steel Works, at Braddock, Pa., has been put in operation and a number of molds have been successfully cast. The entire plant, covering six acres of ground, will be operated by electricity, and will give employment to a large number of men.

The Girard Foundry Company, of Youngstown, O., at a recent meeting, elected H. B. Shields president, Thos. Pavock vice-president, Frank Williams secretary and treasurer, and W. J. Wallace general manager.

John Miller's Foundry, at Youngstown, O., has orders for three 18-inch rolls for the Brown-Bonnell Iron Company, and for a set of 24-inch rolls for the Reeves Iron Company, of Canal Dover, O. Recently it shipped a set of 24-inch rolls to the New Philadelphia (O.) Iron and Steel Company.

At Jones & Loughlin's Foundry, on the South Side, a pulley twenty-four feet in diameter, with a face of 48 inches, was cast a few days ago. It weighed 54,000 pounds, and was cast in two pieces.

Recently a steel casting weighing over forty-five tons was cast successfully at the Standard Steel Works, Chester, Pa. The casting is intended to be used in the stem of the new steamship under construction at Cramp's ship yard, Philadelphia, for the International Navigation Company. The president of the company claims that this is the largest casting ever made from steel in the United States. The contents of the two steel furnaces were used in the pouring,

and over 90,000 pounds of metal were required.

The Gartland Foundry Company, of Cleveland, O., has begun work, and already a large number of orders are on the books.

Pittsburg, Sept. 2 1893.

The new draw-bridge at Flushing, L. I., is fast approaching completion at the Berlin Iron Bridge Co., of East Berlin, Conn., who have the contract for building the bridge. They have a large force of men employed finishing the draw.

The Sargeant Company, of Chicago, formerly the Congdon Brake Shoe Company, have a very fine exhibit in the Transportation Building of everything in the way of brake shoes. They are in a gigantic pyramid of an almost endless variety and size. We are positive that not one foundryman in a hundred has any idea of the variety of cast iron shoes made and exhibited by this firm. All should see it.

The Wrought Iron Bridge Company, of Canton, Ohio, are placing on some of the buildings they have recently constructed a new style of roofing, consisting of thin sheet iron with tarred felt on both sides, and which it is claimed very successfully resists the action of gases and prevents the condensation of moisture on the under side, which sometimes gives considerable trouble by dripping. This ought to make it especially valuable for foundry roofs where the condensation and dripping have frequently caused objection to an all iron roof.

No other article in the July magazines was so widely quoted, perhaps, as that which the Rev. Herbert Stead contributed to the *Review of Reviews* in description of the opening scenes of the World's Fair. In the August number of the *Review* this brilliant descriptive writer gives his impressions of the civic life of the city of Chicago. The article is one of decided intrinsic value, and it evinces a remarkable power of quick observation and generalization. Chicago people will read it with avidity, and so will everybody else.

To any one interested in the subject of core ovens, the advertisement of the Millett Core Oven Company, appearing elsewhere, ought to be of especial interest. As will be seen from the illustration accompanying the advertisement, it has some especial features. The oven is made up of independent shelves, each having two doors, one in front and one behind, which closes the oven when the shelf is swung out to put in or take out the cores. A saving of fuel and heat is at once apparent. The result is the cores are thoroughly baked, and in a much shorter time than by any other oven. They are made in any size desired, although it is claimed that the size illustrated with the lower door 10 inches high, and the other 5 inches high, is the most satisfactory. The manufacturers send out a very neat circular, fully illustrating and explananing them, and giving a lengthy list of concerns who are using them, and who are given as references.

Among the Magazines.

THE WONDRFUL ACCURACY OF TOUCH IN THE HAND OF A TRAINED MACHINIST.—There are plenty of men who will, by the impresssion carried through a pair of calipers and the fingers' ends, determine with a very small percentage, the amount of pressure which shall be required to be exerted by a hydraulic press in order to force onto its shaft an engine crank or locomotive driving-wheel; a measurement in which a thousandth part of an inch variation in diameter causes much more variation in pressure than is permissable. Indeed, on some kinds of work done in the machine shops, a thousandth part of an inch has now become a most commonly employed unit of measurement; a unit which is divided and subdivided into at least ten parts in order to express the degree of refinement arrived at. This, of course, far surpasses the frequently mentioned but supposedly superfluous hair-splitting operation, since an ordinary human hair is about two and a half thousandths part of an inch in diameter. The paper upon which this page is printed is about three thousandths of an inch thick, and one ten-thousandth part of an inch is therefore one-thirtieth the thickness of this sheet. Considerably smaller variations of size may be detected by the trained sense of touch, or rather by the variation in resistance of a pair of cali-

pers passed over the work, and it is even possible for the sense of magnitude and the sensitiveness of the finger ends in relation to it, to be so highly developed as to detect, unaided, and by merely rolling a small steel ball between the thumb and finger, a variation from true sphericity amounting to $\frac{1}{12500}$ of an inch, or about one thirty-seventh part of the thickness of the paper of this page. Ambrose Webster, a machinist of Waltham, whose business is the making of machinery and tools for watch manufacture, having demonstrated his ability to do this.—From "The Machinist" (Men's Occupation), by Fred. J. Miller, in the September *Scribner.*

UNCLE SAM AT THE FAIR.—Many a visitor, foreign and domestic both, has not scrupled to say that in her share of the show the United States of America has little to be proud of; but people so saying do not stop to think. To begin with, when France, Great Britain, Germany and Russia opened to the public gaze the treasure houses of their products, there was no minor exhibit by Department, County or Principality to detract from the magnificent whole of the nation. How is it with us? Each one of our forty-four States is perfectly at liberty to set up shop for itself, be its own exhibitor, and let that inconspicuous dot on the map, the District of Columbia, with all that therein is, do the best it can with what the Senators and Representatives in Congress of these several and sovereign States saw fit to afford it. England and France, Germany, Austria and Russia liberally endowed their exhibits and exhibitors. Columbia, ever saving at the spigot and running at the bung, could indulge in self-glorification on the allowance allotted to her. Leaving to her children the pride and pleasure of showing their visitors through homes of plenty and prosperity such as the masses of the old world has never equalled, she points with calm satisfaction to a new made city, the like of which in grandeur of design, in beauty of architecture, in splendor of proportion, no other nation ever dreamed of building for such a purpose; and, coupling this with the characteristic and often beautiful edifices erected by the States, she declares these to be America's exhibit, and this affair in the drab-colored chicken-coop merely a side-show. Were there the least pretence or ostentation about it, the so-called Government Exhibit at the World's Columbian Exposition would remind one irresistably of the poor relation at a family festival.—Charles King, U. S. A., in September *Lippincott's.*

CREDIT IN PLACE OF SILVER.—But the situation is modified, if not transformed, by another factor in present and in future industrial history; that development of credit machinery which forms the most striking phenomenon in the monetary history of modern times. In the development of credit as a substitute for money we have something like a natural law, which will put to naught the predictions of those who predict disaster from the failure to make wider use of silver. If, indeed, coin money were the sole or the most important constituent in the medium of exchange in civilized communities, silver, or some other metal must certainly be brought in to supplement the scanty growth of the supply of gold. In fact, however, the actual currency of civilized countries tends to consist less and less of specie, more and more of credit substitutes for specie. Bank notes, government notes, and above all bank checks, actually perform the commercial transactions of civilized countries. Specie is the basis of exchange; it is the measure in terms of which the value of commodities is expressed; but it is only to an insignificant extent the medium by which exchanges are actually conducted. The use of credit is of course most highly developed in countries like the United States and England, which lead the world in general industrial development. It is growing steadily and surely in continental Europe, and, beyond question, will continue to grow. Each individual, each financial institution, each government, is tempted to enlarge the scope of credit operations and to diminish the use of actual coin; and the steady pressure of these motives makes the tendency as sure and unalterable as physical law.—From "Why Silver Ceases to be Money," by Prof. F. W. Taussig, in *The Popular Science Monthly*, for September.

A BEAR FEAST.—The country is full of game, and we killed many deer and a cinnamon bear. In the evening, when the Indians come home, they talk about the day's hunt, and what they saw and did. The one that killed the bear said that when he first saw the bear it was about fifteen yards off, and coming for him with open jaws, and growling and roaring like everything. He fired and wounded it. It stopped and stood on its hind legs, roaring worse than ever. While this was going on, the Indian slipped around and shot it through the heart. I cut off the claws and made a necklace out of them,

The next day they dug hole nine feet in diameter and built a big fire in it, and piled rocks all over the fire to heat them. In the meantime the squaws had cut a lot of fir boughs and brought the bear meat. When the fire had burned down, and the rocks were red hot, all the coals and things that would smoke were raked out, and sticks laid acrosss the hole (it was about three feet deep). Then the fir boughs were dipped in water and laid over the sticks. And then meat was laid on, and then more fir boughs, and then the fat (the fat between the hide and the flesh of a bear is taken off whole) is laid on, and then more fir boughs dipped and sprinkled with water. Then come two or three blankets, and, last of all, the whole thing is covered with earth until it is perfectly tight. After about two hours everything is removed, and the water that has beem put on the boughs has steamed the meat thoroughly. Then Chief Joseph comes and cuts it up and every family gets a portion. I helped the squaws cook some wild carrots once (they cook them just as they do the bear, except that they let them cook all night), and Joseph said I must not do squaws' work; that a brave must hunt, fish, fight, and take care of the horses; but a squaw must put up the tepees, cook, sew, make moccasins and clothes, tan the hides and take care of the household goods.—September *St. Nicholas.*

THE LAW OF RETRIBUTION.—Is corporal punishment ever justifiable? It is, exactly as a surgical operation is justifiable, when all other means have been tried and failed, writes Elisabeth Robinson Scovil in a thoughtful article on "The Punishment of Children" in the September *Ladies' Home Journal.* To whip a child for every trivial offense renders him callous blunts his sense of right and wrong. If he wantonly inflicts pain on others he must be made to feel pain himself. It is the stern law of retribution whose working he cannot escape in after life. Wilful cruelty, persistent disobediance may be punished thus, but it is a serious matter to run the risk of arousing the passions rather than of convincing the reason.

GODEY'S MAGAZINE for September contains a variety of matter, and many attractive features. First comes the complete novel, Si's Daughter, by Frederick B. Mott. This is a strong and dramatically told story of western life, and is superbly illustrated by Geo. Wharton Edwards. The Woman Question in Japan is a timely illustrated article by Helen E. Gregory-Flecher; Cornelia Kane Rathbone has a short story called A Dethroned Idea, and Mary Kyle Dallas contributes Mr. Magog's Wooing. The water color portraits are those of Mrs. Francis C. Carolyn of San Francisco and Mrs. Arthur J. Carton of Chicago, and all the departments are complete. The poems are by Clinton Scollard, Richard Burton, Albert Hardy, Belle Hunt, Clara Dixon Davidson and others.

RAILROAD RATES TO CHICAGO.—Speaking of the Transportation Building reminds me of the general subject of transportation to the Fair, and suggests an incident which has a decided Gilbert-and-Sullivan flavor. The Exposition managers were from the start anxious to have the railroads make a low rate to Chicago. Accordingly they appointed a committee on transportation which consisted entirely, I believe, of railroad men whose lines come into Chicago. In their capacity as committeemen these gentlemen passed a resolution requesting their respective railroads to make reduced rates during the World's Fair months. On receiving this resolution by mail the next day at their respective offices, they, in their capacity as railroad managers, wrote letters to the transportation committee denying the request which, as members of that committee, they had made. —*Gustav Kobbi, in the September Century.*

THE COST OF AN EX PRESIDENT'S MANUSCRIPT.—As an illustration of the money paid to writers as soon as they acquire a reputation, the September Cosmopolitan contains less than eight thousand words, for which the sum of sixteen hundred and sixty-six dollars was paid. Ex-President Harrison, Mark Twain and William Dean Howells are the three whose work commands such a price. The September number has more than one hundred illustrations, giving the chief points of interest in the Columbian Exposition, and the Fair is treated by more than a doxen authors, including the famous English novelist, Walter Besant; the Midway Plaisance, by Julian Hawthorn; Electricity, by Murat Halstead; the Liberal Arts Building, by Kunz, the famous gem expert of Tiffany & Company; the Department of Mines, by the chief of that department, etcetera. A feature of this number is a story by Mark Twain, entitled "Is He Living or Is He Dead?"

A SAMPLE OF AMERICAN DASH.—Given the circumstances, in no other country than America would the wheel have ever been built. It took three years to complete the Eiffel tower. Even here it took two years to build the St. Louis Bridge. Both were com

paratively simple work. The builder of the Ferris wheel had not only to construct a work equaling these, but in such a way that it would move, and, moreover, move perfectly—a far greater problem. On December 28 every scrap of iron and steel used in the wheel was "pig." On June 21, less than six months later, 2,200 tons of this "pig," converted into a revolving mechanism as perfect as a pinion wheel of an Elgin watch, began to turn on its 70-ton axis, and has been turning, without let or hindrance, without creak or crack, ever since.—*From "Engineer Ferris and His Wheel," September Review of Reviews.*

EXGHANGES, BOOKS, CATALOGUES, ETC.

The Michigan Stove Company of Detroit, Mich., and almost everywhere else for that matter, are never satisfied unless they are continually reminding their numberless friends in all parts of America that they are remembered. During the past two months several evidences of this have found their way to our desk. First, we have their Catalogue for 1893, which through the medium of fine engravings, rich paper and embossed cover, is really a work of art. Next comes a fan on a hot day as a means of keeping cool, and to apprise us that the Garland Stoves and Ranges are the World's Best. Next we have a yard take measure, the back of which contains a few pointed phrases relative to the Garland line, and following this by a tin cake cutter with the Garland trade mark on it, so that it would be stamped on all cakes cut by it. We are anxiously waiting to see what Brother Gardner produces next.

H. G. Boughton, Akron, O., sends us a very neat Catalogue, devoted exclusively to molding sands, in which he has been an extensive dealer for many years. The one thing that much surprises foundrymen looking over the list is the long list of foundries Mr. Boughton gives who have been, or are, his customers, scattered over a large portion of the continent. It would seem to us that anyone in need of anything in that line would find it profitable to communicate with them.

The following foundries, which have been shut down for some little time, owing to the financial scare, have resumed business: The T. Ahrens Ott Manufacturing Company, Louisville, Ky.; Watertown Iron Foundry, Watertown, Wis.; Buck Stove and Range Company, St. Louis, Mo., and The East Chicago Foundry, at Hammond, Ind.

Among the American steel exhibits, the Bethlehem Iron Company easily lead with a fine display of heavy steel work, the most notable ones being a mammoth ingot 15 feet long and 54 inches wide, weighing 108,190 pounds, and a long, finished steel shaft for a propeller wheel, 20 inches in diameter, with a hole all the way through 8 inches in dimameter. This shaft weighs 55,200 pounds.

Among the Foundries.

Klug, Baches & Stoll will erect a large Brass Foundry in Milwaukee, Wis.

The Henry R. Worthington Foundry at Elizabethport, N. J,, announce a reduction of wages or shut down as the alternative.

The Franklin Iron Foundry (Goff & Welch), of Franklin, Mass., will remove to Milford Mass., and are erecting some suitable buildings.

Fire Fiend.

The Radout Foundry at Wasau, Wis., burned August 16th. Loss $16,000.

A large portion of the foundry and foundry buildings of the Gray's Ferry Foundry and Boiler Company of Philadelphia, was destroyed by fire August 31st. Loss $25,000. They will rebuild at once.

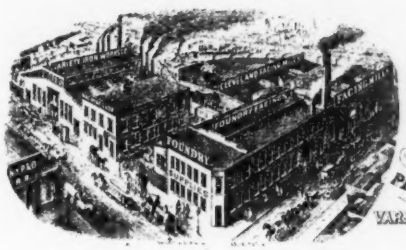
Sold His Wife for $3.50.

At Cincinnati, Ohio, William Klone, an idle workman, was telling William Meyers, an iron molder, of the hard times, and said that if single he would go out to the Cherokee Strip. Meyers replied that he ought to be glad he was married.

"I'll sell you my wife and furniture," said Klone, "for three dollars and fifty cents, and throw in the cat and dog into the bargain."

Meyers handed over the money, and received a clean bill of sale for the outfit.

ANOTHER ADVERTISER HEARD FROM.



CLEVELAND FACING MILLS CO.

Manufacturers of

FOUNDRY FACINGS

AND IMPORTERS AND DEALERS IN

PLUMBAGO, FOUNDRY SUPPLIES, PERFECTWASH.

VARIETY IRON WORKS CO. PROPRIETORS. XX MINERAL FACINGS A SPECIALTY.

CLEVELAND, O.

Cleveland, O. Jan. 17, 1893.

Messrs. Foundry Publishing Co.,

172 Griswold St., Detroit. Mich.

Gentlemen:- Replying to your favor of recent date, would say that you may continue our advertisement until further notice.

We are much pleased with the recent numbers and also with the results received from our ad. We have at least from 60 to 70 new names upon our books, two-thirds of which we can directly trace to inquiries which have reached us through our advertisement with you.

Yours respectfully,

Cleveland Facing Mills,

Geo. P. Miller & Mgr.

That advertising pays when done judiciously is something that the modern business man no longer denies. With its aid even indifferent articles can be successfully disposed of. But when the object of the advertisement is to draw attention to as fine a class of goods as those the Cleveland Facing Mills appear to be making, it can readily be seen that the advertisement must be a profitable investment and judging from the above statement of facts so freely given it would seem as if THE FOUNDRY was giving good satisfaction to its patrons.

FOUNDING AND METALLURGY

As Practiced in the Early Part of the Last Century.

PART SECOND.

Translated from Reaumur for THE FOUNDRY by N. DANTERVILLE.

(Continued from July.)

IF I was asked how many hours of fire should be given bars of iron of any particular size to change them to good steel, I would have to reply that it would be impossible to give any definite information unless I was advised as to the exact form and capacity of the furnace, together with the quantity and size of the bars, the nature of the iron and composition employed—as all of these points have an important bearing on the subject. There are furnaces that require to be lighted for twelve or fifteen days. I have sometimes made steel, it is true, in a very small quantity in less than one hour. To give a clear idea of the reasons for this difference, some explanations are necessary.

We have seen in our trial experiments that fire alone is not capable of producing steel from iron, but needs the assistance of saline and sulphurous ingredients; and in order to enable them to penetrate to the very heart of the iron so that they can act thoroughly, the way must be open. To do this the iron should be heated and softened, and consequently the more promptly the iron in the furnace is heated the greater the degree of heat it will absorb, and the more promptly it will be converted into steel.

The conversion commences when the iron begins to soften, and when it comes to this point it is finished rapidly. At one time I arranged the bars of iron in such a way that I could withdraw some at any time to judge of their condition, and see if it was time to stop the fire. Sometimes on trying those which had been in the fire ten or twelve hours no change was perceptible, while two or three hours later I would withdraw a bar that was nearest to the one I had taken out previously, and often this last one would be perfectly converted to steel, thus showing that the first ten or twelve hours had not produced as much of a change in the iron as the last two or three, and proving that the iron only undergoes a change after it has attained a certain degree of heat. Another time I filled a small creuset with composition, previously taking care to prepare for it a cover, and while it fitted very perfectly, could be easily taken off. I put the creuset on the fire without putting the iron in with it, but when it was at nearly a white heat I heated in a forge some bars of iron until they nearly melted, then opening the creuset I introduced the pieces and covered it up without giving either the creuset or iron time to cool. I then continued to heat the former and found that the iron had been much sooner converted into steel than it would have been had I put it in the creuset at the same time as the composition; and this difference in time would be still further increased were the operation carried on on a larger scale. It might be as well to notice, however, that what we have said of the duration of the fire is applicable also to its intensity, namely: that it might be carried too far. Although iron is not commonly regarded as a fusible metal when it is alone, I have sometimes seen it melted when the fire has been too violent. In this case the fusion is aided by the sulphur and salt of the composition, as it is known that common sulphur would greatly assist in making iron fluid, and all of the iron, of course, that melts in this way is lost, because its nature becomes changed and it is simply cast iron.

In cases where the iron melts without the composition which surrounds it being consumed or burned to ashes, what remains of these bars would be found to be very hard steel, very difficult to work, and nearly always more or less cracked. I have sometimes had two bars softened to the point of touching each other, and sticking together at one end, taking a shape entirely different to what it would have been if simply laid on top of the other, therefore the iron there had been in a state of fusion. These same ends were, however, hardly more difficult to forge than steel which had been in the

fire a little too long. The iron, however, cannot be heated too promptly or violently provided it is not heated to a melting point.

To be able to prove this I made a steel with a very slow and mild fire. The creusets were placed in the furnace where the operation was long and gradual, and I found the steel no better than that which had been made in the most prompt manner. It seems to me, in fact, that no great difference was discernable, except in the fact that there were more and larger lumps on the surface of the steel than when made quickly. I also found out that steel which had been replaced several times in the fire with new composition each time acted as if it had been surrounded at first with a too large quantity of composition, or a too strong composition, thus showing that the long duration of the fire, if not carried to extremes, does not materially injure the iron, if the latter is not changed in the creuset—thus proving that it is not well to put the iron back in the fire after it has once been there with as active or strong a composition as that which it had on the start. It should be surrounded, however, with composition that has been already used, or with one that although new is weak.

My object in putting the steel back in the fire several times with a new composition was to learn to what degree of fineness and hardness it could be brought, and see if its hardness or fineness would not increase each time it was replaced. I found that the oftener it was replaced in the fire the more it required these qualities.

One must not, however, give it more fire either as to quantity or intensity as of a composition that they originally found it necessary to convert it to steel, but there are few kinds of iron that will bear replacing once, and none from which good effects can be secured by replacing it twice; and it can only be welded together or welded with iron by heating it to the melting point several times, although each successive heat of that nature only serves to weaken the steel, and in other ways it has been deteriorated in quality, thus showing that there is a limit beyond which the perfection of steel cannot be carried, because the harder and finer the grain, we found it the more difficult it is to work. No matter what may be the shape of the furnace or creuset, it is highly improbable that all will heat regularly,and it is not even possible that all the bars in the creuset will share equally the action of the fusion and composition, and this shows us that we should place bars of different thickness in different parts ot the creuset, because the thinner ones demand a fire weaker, or of less duration, than the stronger ones, to become steel, and for this purpose bars of three or four different thicknesses should be used.

A few years ago I was appointed, with M. Geofroy and the late M. De Hire, jr., to examine some experiments a foreigner attempted to make, and I was surprised to see the two creusets which were to be laid side by side, and which were to be heated equally in the same fire, that one was filled with large, square pieces of iron, and the other with thin iron, the same as is used for blades. He pretended, nevertheless, that all of this would become steel in the same time for the reason that he had given a stronger composition to one than to the other. It is very necessary to notice here, that not only does it take more time to convert thick bars to steel, but that the time increases in a far greater ratio than that of their thickness—that is to say, that if bars of iron of three lines thickness, become steel in twelve hours in a fire of a certain intensity, that twenty-four hours of the same fire will not convert into steel bars that are of six lines thickness, although the same width as the first, as they will require more than thirty-six hours of the same fire. Repeated experiments prove this to me, consequently it follows that there is profit in using the thin bars in preference to others as there is a gain of time and material; and although it consumes more fire and material in proportion to their weight to make steel of thin bars, yet it is much more easily worked, and what one gains at the furnace they lose at the forge, and besides that the thin bars makethe more perfect steel.

The First American Coke.

THE manufacture of "Connellsville Coke," which is regarded as especially excellent for smelting iron, was commenced in 1841. Weeks (writing in 1883) gives the following account of the beginning of the coke business in the Connellsville region:

"Two carpenters, Provance McCormick and James Campbell, overheard an Englishman, so the story runs, commenting on the rich deposits of coal at Connellsville, and their fitness for making coke, as well as the value of coke for foundry purposes, and they determined to enter upon its manufacture. Mr. McCormick, who is still living, an old man of eighty-four, has given me an account from memory of this enterprise: 'James Campbell and myself heard, in some way that I do not now recollect, that the manufacturing of coke might be made a good business. Mr. John Taylor, a stone-mason, who owned a farm on which the Fayette Coke-works now stand, and who was mining coal in a small way, was spoken to regarding our enterprise, and proposed a partnership —he to build the ovens and make the coke, and Mr. Campbell and myself to build a boat and take the coke to Cincinnati, where we heard there was a good demand. This was in 1841. Mr. Taylor built two ovens. I think they were about ten feet in diameter. My recollection is that the charge was about eighty bushels. The ovens were built in the same style as those now used, but had no iron ring at the top to prevent the brick from falling in when filling the oven with coal, nor had we any iron frames at the mouth where the coke was drawn. In the spring of 1842 enough coke had been made to fill two boats ninety feet long—about eight hundred bushels in each—and we took them to Cincinnati, down the Youghiogheny, Monongahela and Ohio; but when we got there we could not sell. Mr. Campbell, who went with the boats, lay at the landing some two or three weeks, retailing one boat load and part of the other in small lots at about eight cents per bushel. Miles Greenwood, a foundryman of that city, offered to take the balance if we would take a small patent flour-mill at $125 in pay, which Mr. Campbell did. He shipped it here. We tried it, but it was no good, and we sold it to a man in the mountains for $30; and thus ended our coke business.' These gentlemen lost heavily in their venture. It was not until the Baltimore & Ohio Railroad was completed to Pittsburg, and Connellsville coke had been used successfully in the Clinton Furnace of Graff, Bennett & Co., at Pittsburg, that its value as a furnace fuel was thoroughly demonstrated and the foundation laid for the demand that has resulted in such a development of the coke manufacture in the Connellsville region. This furnace was blown in, in the fall of 1859. The coke was at first made from Pittsburg coal, near the furnace on the north side of the Monongahela river, nearly opposite the Point, at Pittsburg. The furnace was run for about three months, when, the coke made in this way not proving satisfactory, it was blown out, and arrangements made to secure a supply from the Connellsville region. The furnace blew in again early in the spring of 1860, the coke used being from the Fayette Coke-works on the Baltimore and Ohio Railroad, made at first on the ground in pits. The result was so satisfactory that thirty ovens were built in 1860, and arrangements were made to secure a continued supply."—*Pop. Science Monthly.*

In Chicago.

Tramp—Madam, will you give me a piece of pie for old times' sake?

Mrs. Manyhusband—Old times! What do you mean, man?

Tramp—Why, have you forgotten me? I was your husband back in the eighties.

Mrs. Manyhusband (looking interested)—Indeed? Your number, please. —*Judge.*

Near some orange trees in grandpa's grove a huge pumpkin lay sunning in its tangle of vines. Little Carrie, from town, caught sight of it and inquired: "Did it break the tree down, grandpa?"

The Modern Traveling Crane.*

BY ALEXANDER E. OUTERBRIDGE, JR.

THE problem which has confronted the modern manufacturer in his effort to produce larger machines of various kinds than heretofore—heavier locomotives, bigger bridges, more powerful war ships, larger castings, and the thousands of other gigantic structures demanded in this era of mechanical progress—has been, not so much a question of the enlargment of the factory buildings, or of increasing the melting capacity of furnaces, or of adding to the number of employees, but it has been mainly a question of obtaining adequate facilities for handling quickly and economically the enormously heavy material composing such great structures, and I do not think it an exaggeration to say that the limit of capacity of any establishment for such large work is determined by its facilities for handling its raw material with economy and despatch.

If you are given unlimited time and an unlimited amount of labor you can accomplish great results with exceedingly simple and crude appliances, but the more you try to economize time and labor in the performance of mechanical work, the more intelligence and skill you must crystallize into the forms of auxiliary machinery.

We all know that the simple dropping of water will, in time, wear away the hardest stone, but the little rock drill, which performs its work in a few moments, represents a high degree of mechanical efficiency.

The great pyramid at Gizeh, near Cairo, erected more than 4,000 years ago (or according to the generally accepted chronological records, more than six centuries before the time of Moses) stands to-day the largest structure of any kind ever erected by the hand of man. Composed of huge blocks of hewn stone, covering a space of more than thirteen acres at its base, equivalent to more than four squares of buildings in this city, it rises to a height of more than 450 feet, or nearly twice the height al the tallest church spire in Philadelphia. The weight of this great mass has been computed at more than 5,000,000 tons.

Modern writers are fond of pointing to these facts as evidences that the ancients possessed mechanical appliances for handling heavy materials far surpassing those of the present time, but, until the two important factors of time and of labor are more clearly stated, I think we are justified in withholding our assent to such a broad inference. What did these autocratic rulers of Egypt care whether 100, or 1,000, or 100,000 slaves were employed for a year or a decade or a century in the construction of this great monument? They were building for all time, and had no thought of economy either of time or of labor in the construction.

The Greek historian, Herodotus, who visited this pyramid about 400 years before the Christian era, tells us that it was regarded in his day as the most stupendous and most venerable monument of antiquity; and he further states that certain inscriptions on stone tablets recorded the fact that 100,000 men were engaged for thirty years in its construction. I have little doubt that if such a problem should be presented to our modern engineers it could be solved with the expenditure of a fraction of the time and labor represented in this great pyramid.

Coming now to a more modern illustration for the purpose of our comparison, I am reminded of an amusing story related of the late Matthias W. Baldwin, in the early days of his locomotive building in this city. The incident occurred, I believe, about the year 1840. One morning Mr. Baldwin received in his mail an order for twenty locomotives, coupled with the condition that they must be completed and ready for delivery within one year of the date of signing the contract. Mr. Baldwin declared that such a proviso with such a large order was preposterous, and that it would be impossible to complete the contract in the time specified. On looking the illustrated history of the Baldwin Locomotive Works, I find that the total output for the year 1840 was nine engines, and it was not until thirty years had elapsed that the first thousand engines were completed.

The present capacity of the Baldwin Locomotive Works is about 1,000 engines a year. To what shall we attribute this enormous expansion? The enlargement of the buildings, and the increased number of employees are important factors, but more men and larger buildings could have been obtained in former years, while the various modern appliances for expediting work were not then invented, by the aid of which the "impossibilities" of 1840 have become the ordinary realities of to-day.

For a final comparison, I would select an illustration in which you may all have a share.

*A paper read before the Franklin Institute, March 15, 1893, with an introductory address stenographically reported.

If I should ask any mechanic to close his eyes for a moment and form a mental picture of the appearance of the machine shop in which he acquired his technical education, and to describe its most prominent features, he would probably say something similar to this:

"I see a long, low, dingy building with small windows and little semi-opaque panes of glass admitting feeble illumination; on the floor I see a miscellaneous assortment of machine tools—lathes, planers, boring mills, etc.—crowded together in some places, while elsewhere are large vacant spaces. I see a number of masts or columns erected at intervals upon the floor, pivoted to foundation plates, and in many instances to the rafters. Attached to these masts are heavy, swinging arms, strongly braced, carrying chains and hoisting tackle. A large casting is about to be transferred from one end of the shop to the other. The chains are attached, the object is raised a few feet from the floor, it is swung round until the arm intersects the circle of the swing of the neighboring apparatus; it is now deposited on a vacant space on the floor, again raised, again swung round and re-deposited, and so it is moved, step by step, until it reaches its final resting-place. Not only is a great deal of time lost in these operations, but valuable floor space is also permanently given up to the hoisting appliances and temporary resting-places for the castings."

Let us now, by the aid of a lantern, visit the new erecting shop of the Baldwin Locomotive Works, and see how this business is accomplished to-day. As we enter the shop, which is nearly a square long and half as broad, we are impressed with its unusual height, its light roof composed largely of glass, its immense windows admitting a flood of light and air. Upon the floor we see scores of locomotives in every stage of manufacture. We perceive that the entire floor space is occupied by the work in hand, and we look in vain for the huge masts and arms, and if we have not kept in close touch with recent progress in such matters, we may well wonder how these heavy materials are conveniently and expeditiously handled.

Presently we see an immense hook, not unlike the claw of some gigantic mythological bird descend from above, grasp a cylinder or a boiler, or possibly a complete locomotive of the largest size, and sail away with it as readily as though it were a toy. We turn inquiringly to our guide and ask:

"What do you call this great mechanical power?

The answer is contained in the title to my paper:

It is the modern traveling crane.

The old fashioned, cumbersome jib-crane, slow of motion and limited in scope to the swing of its clumsy arm, so long a prominent eye-sore on the floor of every foundry and machine shop, is gradually disappearing, and is being superceded in progressive establishments by the *rapid-transit elevated railway traveling crane*, occupying no floor space, and limited in range only by the walls of the building in which it operates. While this modern economical and expeditious method of handling heavy merchandise may still be regarded as a novelty, it has passed the experimental stage, and the mechanism has already reached a degree of perfection which leaves little to be desired in respect of speed, safety, simplicity and accuracy of operation. This is the result of much study, costly experiment and practical experience.

The elevated railway traveling crane consists of four essential parts:

(1) The elevated tracks.

(2) The traveling bridge.

(3) The trolley car traversing the bridge and carrying the hoisting mechanism.

(4) The motor or driving mechanism.

Two independent elevated tracks, with, in some types, parallel tooth racks bolted thereto, are supported by iron columns (or, in the case of a new building especially constructed, built in and supported from the walls). These tracks run parallel to and close to the walls from one end of the building to the other. The bridge travels upon this runway propelled by positive gearing engaging with the racks, thus insuring perfect alignment under all circumstances.

The bridge is constructed of two parallel plate girders extending from rail to rail, spanning in mid-air the breadth of the building. Four large double flanged steel-tired wheels with axles running in bearings are bolted to projections on the girders, a skimming clearance only being permitted between the top of the rail and the bottom of the girders.

Between the girders, heavy steel tracks are laid, bolted to their lower inner flanges, upon which a trolley car, carrying the hoisting mechanism, runs back and forth; thus, by the two motions, the longitudinal motion of the bridge and the cross-motion of the trolley every

square foot of available space in the building can be covered.

The girders forming the sides of the bridge are securely tied together by angle-iron braces, and the bridge is still further stiffened against lateral strains by exterior girders, extending upwards and outwards at a sharp angle from the bottom flanges of the bridge members, and bolted to struts or braces extending across the top of the bridge. By this method of construction great rigidity is secured, while the entire space within and beneath the bridge is left unobstructed for the working of the trolley car and machinery.

The car which travels on the birdge tracks is provided with a grooved drum and depending double chain wound thereon, carrying a forged swivel-hook mounted securely in a hoisting block on ball-bearings, the blocks being furnished with sheaves through which the chain runs. The friction on the swivel is so reduced by the ball-bearings that it was found in actual trial that a load of fifty tons suspended from the hook could easily be rotated by one man.

The winding of the double chain in the grooves of the drum is always towards the centre. This insures a perfectly vertical lift of the load, an advantage always, and a necessary feature in many instances.

The placing of the rails for the trolley on the top of the bridge, as is sometimes done, is open to serious objection on account of the tendency to produce unstable equilibrium of the bridge, or spreading of the girders, and disasters have occurred from the toppling over of the trolley when heavily loaded, due to these causes. It can readily be understood that these defects are eliminated by locating the point of support of the load on the lower inner flanges of the girders, instead of from a trolley on the top of the bridge.

The racks meshing with pinions on both ends of the bridge prevent any tendency to mount the rail or to jam on the runway and permit of high speeds with safety; and, even if an accident should happen to the running gear of the bridge, such as the breaking of an axle, the bridge mould merely settle down half an inch and then rest upon the rail.

Retaining clutches automatically hold the load securely from the moment it leaves the floor until it is re-deposited. The chain can never *run* down, but the load must always be *pushed* down by the operator moving a lever.

The operator's post is on a platform or cage supported at a convenient point under the bridge; by simple lever movement he applies the motive power to drive the bridge along the rails, and simultaneously to drive the trolley across the bridge—so that, during the two motions at right angles, the hook depending from the chain travels in the resultant diagonal direction, until it is vertically over the object to be hoisted. A simple application of power revolves the drum, lowering the chain, and, when the object is attached, a like delicate touch of the lever in the opposite direction causes the drum to revolve in the opposite direction, winding up the chain and lifting the object to the desired height. The bridge and the trolley are again started in their respective longitudinal and cross movements, suspended object traveling in a straight line—the resultant of the two directions—from its starting point towards its destination, until vertically over the exact spot where it is to be deposited, when it is a simple matter to lower and adjust it in place. The speed of all these movements is under absolute control of the operator, and the precision of adjustment where delicacy of movement is required, as in the setting of cores, closing of flasks, etc., is remarkable both for its perfection and the ease with which the operation is performed, these movements may be, and frequently are, directed from below by the finger of the foreman.

Various motive powers are applicable to operate a traveling crane, such as—

(1) An independent engine and boiler carried on the crane.

(2) A square shaft, with tumbler bearings, bolted to the wall of the building.

(3) An electric motor or motors.

Each of these methods of driving the crane possesses individual peculiarities, and each offers particular advantages for special classes of work and convenient adaptation to peculiar environments.

The best evidence that these distinctions are understood and appreciated, is furnished by many large establishments, such as the Baldwin Locomotive Works, where all of these types, of recent construction, may be seen in the different departments, ranging from liliputian cranes of five or ten tons capacity, adapted to quickly shifting a cylinder or other portion of an engine from place to place, in its progress from a rough casting in the foundry to a finished piece in the erecting shop, to the 100-ton electric giant which picks up a completed

"Mogul" or "Decapod" engine of the largest size, carrying it swiftly over the heads of the workmen and depositing it gently on a railway siding near the exit.

While we have thus shown that there are various methods applicable to driving the traveling cranes, and in daily use for that purpose, many persons regard the electric current as, *par excellence*, the modern method, and, in accordance with the demand thus created, large electric traveling cranes, having two trolleys on the bridge and five independent motors, have been constructed and are now in operation. A speed of travel on the runway of five hundred feet per minute is attained, and a correspondingly quick traverse of the bridge by the trolley. These may be regarded as "lightning express" traveling cranes. The rate of travel or of hoisting is perfectly controllable from that of a snail's pace to the maximum speed, and the limit of speed is mainly a question of expenditure of power.

As a rule, a slow motion is required when the crane is hoisting and transporting heavy weights, but the more rapidly the crane can travel from a locality in the building where its work is completed to another where its help is needed, and the more rapidly it can perform the preliminary operations of attaching chains to the object to be lifted (which tedious work may be said to occcupy usually about nine-tenths of its time during working hours) the more efficient the appliance becomes.

The method of operating a traveling crane by electricity forms the most novel type, and yet so rapid has been the evolution that already several sub-types are included under this general head. When a single motor is carried on the cage, the clutch system, similar to that used with the square shaft mechanism, is employed. In the three-motor or five motor, or entirely electric crane, the clutches are discarded, with the exception of one pair on the trolley.

In the electric system, one or more motors on the bridge or trolley are supplied with current from a dynamo by means of an overhead wire running the length of the building. By touching a few simple levers, or hand wheels, the wheels of the bridge are caused to revolve, the trolley car itself is caused to travel back and forth on its cross-tracks, and the grooved drum carrying the chain and hook is caused to rotate, raising or lowering the hook—all of these motions being performed either at the same time or separately, in the same direction or in opposite directions, at the same speed or at different speeds, fast or slow, without confusion, by one man of intelligence. The operators are usually chosen from the ranks of unskilled labor, and are soon taught the simple movements. The levers are so arranged that the necessary as well as natural movements of the operator are in a direction he wishes the object to go, thus relieving him of embarrassment or uncertainty.

A representative of THE FOUNDRY recently had the pleasure of riding from the Chicago headquarters of the Detroit Stove Works to the World's Fair in the Detroit Stove Works' Tally-Ho Coach, and wishes to acknowledge that nothing which the World's Fair City contains will contribute more pleasure than a trip over Chicago's beautiful boulevards to the World's Fair grounds than the trip mentioned, and those who have been so fortunate as to secure tickets should make it a point to use them.

The *Engineering Review* is the name of a new monthly trade publication edited by J. S. Jeans and published in London, England. It proposes to embrace and review ths whole engineering field in all its branches, and the thoroughness with which it goes at the subject in its initial number argues well for a brilliant future.

We are in receipt of a very large and handsome Catalogue issued by the Toronto Radiator Manufacturing Company, Toronto, Ont., and confess having been taken by surprise at its elegance as well as the beauty and completeness of their line of Steam and Hot Water Radiators, Fixtures, etc. Canada certainly is not one particle behind any other section of the world in this line, and the company mentioned appear to be fully abreast of the times in their manufactures.

Questions and Answers.

"W. S." asks: In the manufacturing of cast iron pipe, what are generally supposed to be the main causes of the following defects;

I. Honeycombed pipe.

II. About four or five feet from the bead end

a hole from the size of a fifty cent piece to a dollar bill, pipe in all other respects being perfect from bell to bead.

Cores are perfectly dry, straight, and plenty of vent. Iron hot and fluid.

$500 FOR A WORD.

Here is the Paragraph.

"I now behold, said he, what I never could believe, the glories of the stupendous..... [Missing Word.] ....."

This complete sentence has been previously printed, and can be found in most libraries. It will again be published complete in an early issue of *The Illustrated World's Fair*, announcing page and name of publication.

The publishers of *The Illustrated World's Fair*, Chicago offers the person or persons supplying the correct missing word to the above paragraph, $500.

If you wish to enter the contest, send 25 cents for a copy of *The Illustrated World's Fair*, containing coupon and instructions governing contest. Ask your newsdealer for it. It is the finest, most attractive, ably edited and profusely illustrated magazine in the world. The only official publication illustrating the progress, and every phase and feature of the great Exposition from start to finish. It is an album of photographic art. It is a library of literary gems. It is brim full of contributions from great celebrities. The bound volumes make a complete pictorial and literary history of this stupendous enterprise. Twenty-two consecutive numbers and three bound volumes ready for delivery; we want agents in every town, city and county to take orders for this incomparable work. It sells itself when shown; any man, woman, boy or girl can sell it. Send 25 cents for sample and special terms; great inducements to subscription book people; exclusive territory.

Address *The Illustrated World's Fair* (P. O. Drawer "T"), Jewell N. Halligan, General Manager, McVicker's Theatre Building, Chicago. Read price list.

Reihle Brothers, the well known testing machine manufacturers, of Philadelphia, Pa., have published a Catalogue of all their world-famous testing apparatus, together with a large amount of their special machinery, such as Ball-bearing Jack Screws, Pig-metal Trucks and Turn-tables, Hay and Steam Rope Twiiters, Hydraulic Pumps, Presses, Foundry Taucks and Barrows. To begin with, the pages are a quarter size, or about double the size of the page upon which this is printed, and over one hundred and fifty in number printed on fine, heavy paper and properly illustrated, with full particulars concerning their testing apparatus for all purposes, particularly the testing machine designed expressly with a view of being used in iron and steel foundries. Among other features we noticed a long list of patents controlled by this firm, a list of the various parties having their machines in use, including the United States and foreign governments, universities, colleges and manufacturers of every description. We are advised that those interested in the subject can have a Catalogue sent them upon application, and as it is a mine of information in itself, any one desiring to be posted on this subject should secure one.

NOTICE.

Advertisements inserted under this head for 25 cents a line each insertion.

WANTED—Loam Molder for heavy and light castings. Steady employment. Man must be sober and industrious. Address, stating experience, wages and references, I. F. & M. W'ks, Ivanhoe, Wythe Co., Va.

FOR SALE—Entire outfit of a first class Foundry and Machine Shop. Can see itemized list of what we have for sale in July number. All in first class condition and will almost give it away. Apply at once. Have to quit business owing to bad health. Address CHARLES GILBERT & SON, Albany, Mo.

WANTED—A position as foundry foreman, by a good loam and sand molder of steady habits; well up in first class work and methods; also a fair draughtsman. Address J. B., care of THE FOUNDRY.

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FOUNDRY FOREMAN—is open for an engagement with parties, and whose sobriety and push will be appreciated. Understands mixing and melting of irons, and has had fifteen years experience in first class shops. A 1 references as to ability and reliability. Address "Push," care of THE FOUNDRY.

FOR SALE—Foundry and Machine Shop in a flourishing manufacturing city; a good farming country, small capital required. Address, WM. ENGBRING, Cedarburg, Wis.

From Mine to Furnace.

THE mining or quarrying of iron ores, coal and limestone, from the earth; their preparation, handling, transportation, and the smelting of the ores into pig iron, offer the theme for what could be made an instructive story, increasing in interest as we take into consideration the earlier history of coal and ore mining and iron production, and as we note the improvement made in processes, and the advances in quantity and quality produced. In several lectures delivered before the Franklin Institute of Philadelphia, in a presidential address before the American Institute of Mining Engineers, and in a contribution to the "Mineral Resources of the United States Calendar Year 1892," issued by the U. S. Geological Survey, the writer has treated several of these subjects in a necessarily somewhat disconnected manner. They are here brought together, however, in the shape of a comparatively complete and consecutive story.

The history of iron production and manufacture is old. We have been told of Tubal Cain in the seventh generation from Adam, being "an instructor of every artificer in iron," and of the use of this metal in the pymrids of Egypt, and in the gates of the city of Babylon, of the ancient book of Job mentioning "bars of iron," "barbed irons," etc. This iron was probably made in the simplest possible manner, the ore being taken from the ground, and converted into wrought iron, with the aid of wood or charcoal in heaps in pits, or in crude furnaces. But we need not go far back to trace developments, for the past half century, or even the last twenty years, show more advancement in this specialty than all the preceding years since iron was first mentioned as a metal.

To smelt iron ores a fuel and a flux are necessary, and in this country, four fuels are employed, namely, anthracite coal, bituminous coal, coke made from bituminous coal, and charcoal. Coke is by far the most in demand for this purpose, and raw bituminous coal is used to but a limited extent, no record being now kept of the comparatively small portion of pig iron made with it exclusively. Including the output of furnaces using raw bituminous coal alone, or mixed with coke, with those employing coke alone for this purpose, we find that of all the pig iron produced in the United States, 70.6 per cent. is smelted with coke and bituminous coal.

Coke is also liberally used with anthracite coal in varied proportions in the eastern part of the United States, 18.8 per cent. of the pig iron being made with these mixed fuels, and but 3.7 per cent. of our pig iron output being smelted with anthracite coal alone; the remainder, 6.9 per cent. is produced by the use of charcoal. At present the relative employment of the different fuels ranks in the following order.

Coke, sometimes mixed with raw bituminous coal.
Anthracite and coke mixed.
Charcoal.
Anthracite alone.
Raw bituminous coal.

Limestone is the universal flux used, although different conditions require stone of varying composition, from nearly pure carbonate of lime to a mixture of the carbonate of lime and magnesia, known as dolmolite.

Seventy years ago, the "burning stones" which we recognize as anthracite coal were first mined, but what has now become a magnificent industry grew with comparative slowness for two decades; and it was not until 1842 that 1,000,000 tons of anthracite coal per annum were produced.

The opening of this fuel field, however, soon exerted a stimulus on railway and canal construction, some of the earlier enterprises and numerous later additions having been projected and maintained to carry anthracite coal to points of consumption or to navigable waters. And this stimulus reacted upon the industry itself. Larger shipments were demanded to meet the requirements of the market developed by these improvements.

From 1842 to 1864 the annual production of this form of fuel increased ten fold, from 1,000,000 to 10,000,000 tons, and this amount was again doubled (to 20,000,000 tons) in 1873. The shipments of anthracite coal for 1890 show

another step in geometrical progression; for, if to the 36,000,000 tons of anthracite shipped, we add the coal used at the mines, a production exceeding 40,000,000 tons is accounted for.

The astonishing record of the mining industry within this limited area can be best appreciated by comparing the output with that of another mining industry. Thus, the weight of anthracite coal mined in Pennsylvania in 1892 was nearly three times as great as the total iron-ore product of the United States; and this coal was obtained at a greater average depth, and under conditions generally less favorable, than are found at the iron-ore mines.

The total output of the anthracite regions of Pennsylvania for the past 70 years, approximates 750,000,000 tons. Of this, over twelve per cent. was obtained in the forty years between 1820 and 1860; fifteen per cent. in the decade following; nearly twenty-five per cent. between 1870 and 1880; and for the next ten years the output has averaged about 35,000,000 tons annually, aggregating nearly forty-eight per cent. of the whole. Of the total output of the anthracite coal region as recorded, one-half has been mined since 1880. The production in 1882 exceeded 45,000,000 tons. Mr. J. H. Jones, special census agent, places the value at the mines of the anthracite coal product of Pennsylvania in 1889 at $65,721,578, demanding, at 362 regular establishments, the services of over 124,000 employees, who received in that year nearly $40,000,000 as wages. The capital invested in coal lands amounted to almost $162,000,000; and this valuation does not include undeveloped properties nor any surface improvement except such as are necessary for mining and preparing the coal. If to the above amount were added the coal lands held in reserve, the numerous dwellings, and the enormous railroad facilities especially built and maintained to convey the product of the mines and breakers to trunk lines, the valuation would be greatly augmented.

An approximate review of the consumption of all kinds of fuel in the United States for the past twenty years, may be obtained from the following census data:

The fuel consumed in the United States, exclusive of natural gas, but including the coal and wood converted into gas, requires the conveyance, by various methods, of nearly one and a fifth million gross tons each day of the year (no unimportant factor in the national problem of transportation), and demands the energies of over one million wage-earners to mine, cut, handle, and convey it to points of consumption. The fuel consumption, per capita, in the United States, is in calorific value equivalent to three and one-half tons of coal per annum. Possible economies may reduce this to two and one-half tons for the same amount of work performed.

	1870.	1880.	1890.
Gross tons of anthracite coal	13,925,229	25,580,189	40,714,721
Gross tons of bituminous coal	15,356,619	38,242,641	85,383,059
Bushels of charcoal		74,008,972	*90,000,000
Cords of wood		145,778,137	*180,000,000
Barrels of petroleum	5,260,745	26,286,123	34,820,306
Natural gas, value in coal displaced	No report.	No report.	*$20,000,000

By reason of the extended area of the bituminous coal fields, their development has greatly benefitted the entire country. This fuel has supplied most of the illuminating and fuel gas, and, in addition to its liberal use for domestic and steam-producing purposes, the coke resulting from its distillation has influenced the iron industry to a wonderful extent, as is shown by the following figures taken from the reports of the ninth, tenth and eleventh censuses:

Material Produced.	Gross Tons 1870.	1880.	1890.
Pig-iron	1,823,876	3,375,912	8,553,374
Manufactured iron	1,287,347	2,101,183	‡2,518,193
Steel *a*, finished product; *b*, ingots	*a*44,426	*b*1,022,956	*b*3,988,327

*Estimated.

‡As the census statistics have not been issued, the above figures are taken from the report of the American Iron and Steel Association for 1890.

The output of bituminous coal, added to the production of anthracite in 1892, brings the total of coal mined in the United States to eighty-three per cent. of that mined in Great Britain, the country which supplies nearly as much coal as all others in the world combined, exclusive of our own. In other words, the United States now produces over thirty per cent. of the world's output of coal, while it consumes, in addition, great quantities of wood, charcoal, oil, and natural gas. The United States is the great fuel consumer of the world.

Over 2,000,000 cords of wood are annually cut to produce the 90,000,000 bushels of charcoal which I estimate were used in smelting ores of iron and of the precious metals, and for other specialties. The cord-wood used as fuel for various purposes largely exceeds that cut for charcoal, but the amount can only be roughly approximated. The total wood of all kinds used for fuel is estimated by Mr. B. E. Fernow, chief of the forestry division of the United States Department of Agriculture, at 180,000,000 cords per annum.

Peat is used to a moderate extent only; but various methods of drying or preparing it are passing through experimental stages.

In thirty-two years the product of petroleum has grown from 2,000 barrels to 35,000,000 barrels annually, reaching a total for the whole period of 450,000,000 barrels. Of the present output, approximately forty per cent. is used for fuel; and as this has a calorific value, three barrels of petroleum being taken as equivalent to one ton of coal, of over 4,500,000 tons of coal annually. The convenience of application favors the use of petroleum in localities where coal commands relatively high prices, and in cases where intermittent firing is employed; and we may anticipate a growing demand for this form of fuel.

It is perhaps impossible to determine the quantity of natural gas used in this country, but a measure of its importance may be found in the equivalent money value of the coal it has displaced, which which is calculated to approximate $20,000,000 annually. Moreover, the extensive introduction of natural gas for industrial and domestic uses has stimulated the employment of producer gas, and in many instances the manufactured gaseous has supplanted the natural solid fuel.

The magnitude of the quantities represented by our fuel supply emphasizes the importance of economies in its use. A saving of one per cent. of the fuel of all kinds consumed in the United States would be equivalent to 2,300,000 tons of coal per annum. If all the fuels produced in the United States were used for one year for the generation of steam, they would furnish continually through boilers and engines of ordinary efficiency nearly 12,000,000 horse power. An average reduction in American blast furnaces of one hundred weight of fuel per ton of pig-iron made would amount to an annual saving of nearly a half a million tons of coal, and proportionate economies in iron and steel manufacturing processes would more than double this saving.

The crowds of coal pickers covering a city's ash heaps, attest the waste of fuel imperfectly consumed for domestic and manufacturing purposes, and the "smoke nuisance" (the abatement of which is always in the future) is constantly before us as an indication of improvidence. The evil is to be overcome, if we believe the announcements of trade circulars, by patent boiler settings, which facilitate the evaporation of water at a rate in excess of theoretical perfection; by smoke consuming devices, which effect such economies that it will pay to burn coal merely to utilize the smoke; or by stoves or furnaces which through some secret of nature confided to the inventor only, utilize upward and downward draughts in bringing the combustible myth to intensify immensely the heat of the normal fire. Economies are also claimed for special details in blast furnaces, heating furnaces, puddling furnaces, or other metallurgic constructions, some promising a return of more heat units than are acceptable as theoretically attainable.